

AMENDMENTS TO THE CLAIMS:

Please amend the claims as follows:

Claims 1-85. (Canceled)

86. (new) A recombinant protein

(a) having luciferase activity,

(b) having at least 90% similarity to SEQ ID NO: 37, and

(c) having the amino acid sequence of a wild-type luciferase sequence with the proviso that at least the amino acid residue of the recombinant protein corresponding to amino Thr-214 of SEQ ID NO:37 is different from the amino acid residue of the corresponding wild-type luciferase sequence and wherein the recombinant protein has increased thermostability as compared to an enzyme having the amino acid of the corresponding wild-type luciferase at this position.

87. (new) A recombinant protein having luciferase activity and increased thermostability as compared to the *Photinus pyralis* wild-type luciferase (SEQ ID NO: 37), wherein in the sequence of the recombinant protein, the amino acid residue corresponding to Thr-214 in *Photinus pyralis* luciferase is an amino acid other than threonine, and wherein the recombinant protein is encoded by a nucleic acid which hybridizes under high stringency conditions to SEQ ID NO: 38, said high stringency conditions comprising a hybridization at 65°C in 0.1 x SSC buffer.

88. (new) A recombinant protein having luciferase activity and increased thermostability as compared to the *Photinus pyralis* wild-type luciferase (SEQ ID NO: 37), wherein in the sequence of the recombinant protein, the amino acid residue corresponding to Thr-214 in *Photinus pyralis* luciferase is an amino acid other than threonine, and wherein the recombinant protein is encoded by a nucleic acid which hybridizes under high stringency conditions to a nucleic acid sequence encoding SEQ ID NO:37, said high stringency conditions comprising a hybridization at 65°C in 0.1 x SSC buffer.

89. (new) The recombinant protein of claim 87, in which the amino acid other than threonine is one of the group consisting of cysteine, alanine and asparagine.

90. (new) The recombinant protein of claim 88, in which the amino acid other than threonine is one of the group consisting of cysteine, alanine and asparagine.

91. (new) The recombinant protein according to claim 86 consisting of 550 amino acids, said recombinant protein having the amino acid sequence of SEQ ID NO:37 with the proviso that more than one amino acid residues of the recombinant protein are different from SEQ ID NO:37.

92. (new) The recombinant protein according to claim 86 wherein up to 50 amino acid residues are different from SEQ ID NO:37.

93. (new) The recombinant protein according to claim 86 comprising SEQ ID NO:37 with the proviso that the amino acid residue corresponding to position 214 of SEQ ID NO:37 is not Thr.

94. (new) The recombinant protein according to claim 86 wherein the amino acid residue corresponding to residue 214 in SEQ ID NO:37 is alanine.

95. (new) An isolated nucleic acid sequence which encodes a recombinant protein according to claim 86.

96. (new) A vector comprising a nucleic acid sequence according to claim 95.

97. (new) An isolated cell transformed with a vector according to claim 96.

98. (new) The cell according to claim 97 which is a prokaryotic cell.

99. (new) The cell according to claim 97 which is a plant cell.

100. (new) A plant comprising a cell according to claim 99.

101. (new) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 86 in said reaction compared with contacting the

corresponding wild-type luciferase in said reaction.

102. (new) A kit comprising a protein according to claim 86.

103. (new) The kit according to claim 102 which further comprises luciferin.

104. (new) A recombinant protein having luciferase activity and increased thermostability as compared to the *Photinus pyralis* wild-type luciferase (SEQ ID NO: 37), wherein the recombinant protein comprises SEQ ID NO: 37 with the proviso that the amino acid residue corresponding to Thr-214 of SEQ ID NO: 37 is cysteine, alanine or asparagine.

105. (new) The recombinant protein of claim 104, wherein the amino acid residue corresponding to Thr-214 of SEQ ID NO: 37 is an alanine residue and further wherein the recombinant protein comprises one or more of the following additional mutations:

(a) an alanine residue at the amino acid residue corresponding to Phe-14 of SEQ ID NO: 37;

(b) an alanine residue at the amino acid residue corresponding to Leu-35 of SEQ ID NO: 37;

(c) a leucine residue at the amino acid residue corresponding to Ala-215 of SEQ ID NO: 37;

(d) an alanine residue at the amino acid residue corresponding to Ile-232 of SEQ

ID NO: 37;

(e) a leucine residue at the amino acid residue corresponding to Phe-295 of SEQ

ID NO: 37; and

(f) a lysine residue at the amino acid residue corresponding to Glu-354 of SEQ ID

NO: 37.